

What is claimed is:

[Claim 1] A multi-layer article comprised of a fluoroelastomer polymer layer and a substrate wherein the bond between the layers is formed through a three stage molding technique where the substrate alone is first pre-cured to an incomplete state of cure in a mold at a temperature of 75 to 150 C, secondly an uncured fluoroelastomer film of less than or equal to 0.3mm thickness is placed on the substrate and the layers are cured together in the mold at a temperature of 150 to 250 C and finally the article is removed from the mold and cured in an oven at a temperature of 100 to 180 C such that the cross linking of the layers forms a permanent bond between them, and wherein the fluoroelastomer comprises a monomer segment derived from an olefinic hydrocarbon.

[Claim 2] The multi-layer article of claim 1, wherein the fluoroelastomer is a copolymer including tetrafluoroethylene.

[Claim 3] The multi-layer article of claim 1, wherein the fluoroelastomer is a copolymer including vinylidene fluoride.

[Claim 4] The multi-layer article of claim 1, wherein the fluoroelastomer is a copolymer including hexafluoropropylene.

[Claim 5] The multi-layer article of claim 1, wherein the olefinic hydrocarbon is propylene.

[Claim 6] The multi-layer article of claim 1, wherein the olefinic hydrocarbon is ethylene.

[Claim 7] The multi-layer article of claim 1, wherein the substrate includes a non-fluorinated polymer.

[Claim 8] The multi-layer article of claim 7, wherein the non-fluorinated polymer comprises a thermoplastic polymer.

[Claim 9] The multi-layer article of claim 7, wherein the non-fluorinated polymer comprises a thermoplastic elastomer.

[Claim 10] The multi-layer article of claim 7, wherein the non-fluorinated polymer is selected from the group consisting of nitrile rubbers, ethylene-

propylene–diene monomer rubbers, epichlorohydrin rubbers, ethylene–acrylate copolymer rubbers, polyamides, polyurethanes, polyolefins, and combinations thereof.

[Claim 11] The multi-layer article of claim 1, wherein the fluoroelastomer is a fluoroplastic.

[Claim 12] A process for preparing a multi-layer article that is comprised of the following:

providing a polymer layer comprising a fluoropolymer;

providing a substrate;

providing a method where the bond between the layers is formed through a three stage molding technique where the substrate alone is first pre-cured to an incomplete state of cure in a mold at a temperature of 75 to 125 C, secondly an uncured fluoroelastomer film of less than or equal to 0.3mm thickness is placed on the substrate and the layers are cured together in the mold at a temperature of 150 to 225 C, and finally the article is removed from the mold and cured in an oven at a temperature of 100 to 150 C such that the cross linking of the layers forms a permanent bond between them, and wherein the fluoroelastomer comprises a monomer segment derived from an olefinic hydrocarbon.

[Claim 13] The process of claim 12, wherein the fluoroelastomer is a copolymer derived from a monomer selected from the group consisting of tetrafluoroethylene, vinylidene fluoride, hexafluoropropylene and an olefinic hydrocarbon.

[Claim 14] The process of claim 13, wherein the olefinic hydrocarbon is selected from the group consisting of ethylene and propylene.

[Claim 15] The process of claim 12, wherein the substrate is selected from the group consisting of a non-fluorinated polymer or a metal.

[Claim 16] The process of claim 15, wherein the non-fluorinated polymer is selected from the group consisting of nitrite rubbers, ethylene-propylene-diene monomer rubbers, epichlorohydrin rubbers, ethylene-acrylate copolymer rubbers, polyamides, polyurethanes, polyolefins, and combinations thereof.

[Claim 17] The multi-layer article of claim 1, wherein the article is a fine bubble diffuser membrane as used in the waste water treatment industry.

[Claim 18] The multi-layer article of claim 1, wherein the article is a coarse bubble diffuser membrane as used in the waste water treatment industry.